

23

3. The process of claim 1, wherein the introduction of the solvent occurs while the solvent is substantially in liquid form.

4. The process of claim 1, wherein the high pressure apparatus comprises an autoclave. 5

5. The process of claim 1, further comprising purging or evacuation followed by back-filling the capsule prior to introducing the solvent.

6. The process of claim 3, further comprising introducing thermal energy into the capsule during the purging or evacuation followed by back-filling. 10

7. The process of claim 6, wherein the thermal energy provides a temperature between 25 and 500 degrees Celsius during the purging or evacuation followed by back-filling.

8. The process of claim 5 further comprising performing a purging or back-filling process of the capsule using solvent vapor. 15

9. The process of claim 1, wherein the high pressure apparatus has an inner diameter greater than 100 mm.

10. The process of claim 9, wherein the high pressure apparatus has an inner diameter greater than 150 mm. 20

11. The process of claim 10, wherein the high pressure apparatus has an inner diameter greater than 200 mm.

12. A process for growing a crystalline gallium-containing nitride, the process comprising: 25

providing an autoclave or a capsule comprising gallium-containing feedstock in one zone and at least one seed in another zone;

while maintaining an elevated pressure within the autoclave or capsule, introducing a first solvent capable of forming a supercritical fluid into at least the one zone and the other zone; 30

processing one or more portions of the gallium-containing feedstock in the supercritical fluid to provide a super-

24

critical solution comprising at least gallium containing species at a first temperature;

growing crystalline gallium-containing nitride material from the supercritical solution on the seed at a second temperature, the second temperature being characterized to cause the gallium containing species to form the crystalline gallium containing nitride material on the seed;

removing thermal energy from the autoclave or capsule to form a second solvent from the supercritical solution; and

removing the second solvent from the autoclave or capsule through an outlet; and

transferring the second solvent from the outlet to a purification process.

13. The process of claim 12 wherein the solvent capable of forming a supercritical fluid is introduced into the capsule at an elevated pressure of at least about seven (7) atmospheres.

14. The process of claim 12 further comprising transferring the second solvent from the outlet to a purification process to recycle the second solvent.

15. The process of claim 12 further comprising transferring the second solvent from the outlet to a purification process to recycle the second solvent; purifying the second solvent in the purification process to form a third solvent; and transferring the third solvent to the autoclave or capsule.

16. The process of claim 15 wherein the third solvent is substantially the same as the first solvent.

17. The process of claim 12 wherein the second solvent comprises a hydrogen species, nitrogen species, one or more trace metals, and dissolved mineralizer.

18. The process of claim 12 wherein the first solvent is substantially NH_3 .

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